CLAIMS

1. An optical fiber terminator comprising:

a) a body exhibiting a substantially uniform refractive index n_b;

b) an input interface for admitting a light beam from an optical fiber into said body;

c) a concave reflective surface provided in said body opposite said input interface for receiving said light beam and reflecting said light beam along a near-normal direction;

d) a convex toroidal reflective surface provided in said body for receiving said light beam reflected by said concave reflective surface and reflecting said light beam along an off-normal direction; and

e) an output surface for out-coupling said light beam.

2. The optical fiber terminator of claim 1, wherein an azimuth angle between said near-normal direction and said off-normal direction taken about a rotation axis that connects the point of incidence of said light beam on said concave surface to the point of incidence of said light beam on said convex surface is less than 90 degrees.

3. The optical fiber terminator of claim 1, further comprising a folding mirror surface for reflecting said light beam within said body.

4. The optical fiber terminator of claim 3, wherein said folding mirror surface is coated by a reflecting material.

5. The optical fiber terminator of claim 3, wherein said folding mirror surface comprises a light-conditioning element.

6. The optical fiber terminator of claim 1, wherein said input interface is a surface located adjacent said convex toroidal reflective surface.

7. The optical fiber terminator of claim 1, wherein said concave reflective surface is a concave toroidal reflective surface.

8. The optical fiber terminator of claim 7, wherein said convex toroidal reflective surface and said concave toroidal reflective surface are adjusted to mutually cancel wavefront distortions in said light beam.

9. The optical fiber terminator of claim 8, wherein said convex toroidal reflective surface and said concave toroidal reflective surface are dimensioned to collimate said light beam.

10. The optical fiber terminator of claim 8, wherein said convex toroidal reflective surface and said concave

toroidal reflective surface are dimensioned to focus said light beam.

11. The optical fiber terminator of claim 1, wherein said body comprises a molding material having a substantially uniform coefficient of thermal expansion.

12. The optical fiber terminator of claim 11, wherein said molding material is an organic polymer.

13. The optical fiber terminator of claim 11, wherein said molding material is a glass.

14. The optical fiber terminator of claim 1, wherein said concave reflective surface and said convex toroidal reflective surface are coated by a reflecting material on the surface of said body.

15. The optical fiber terminator of claim 14, further comprising an optical monitor coupled to said body for monitoring the intensity of said light beam.

16. The optical fiber terminator of claim 15, wherein said optical monitor is coupled to one of said concave reflective surface and said convex toroidal reflective surface.

17. The optical fiber terminator of claim 1, further comprising a light-conditioning element in said body for conditioning said light beam.

18. The optical fiber terminator of claim 17, wherein said light conditioning element is a coating selected from the group consisting of wavelength-filtering coatings, anti-reflection coatings, and polarization-altering coatings.

19. The optical fiber terminator of claim 17, wherein said light conditioning element is a grating.

20. The optical fiber terminator of claim 1, further comprising a light-conditioning element on a surface of said body for conditioning said light beam.

21. The optical fiber terminator of claim 20, wherein said light conditioning element is a coating selected from the group consisting of wavelength-filtering coatings, anti-reflection coatings, and polarization-altering coatings.

22. The optical fiber terminator of claim 20, wherein said light conditioning element is a grating.

23. The optical fiber terminator of claim 1, wherein said input interface is a surface of said body.

24. A monolithic fiber terminator array comprised of a number of optical fiber terminators of claim 1.

25. An apparatus for manipulating light comprising:

a) a body exhibiting a substantially uniform refractive index n_b;

b) an input interface for admitting a light beam into said body;

c) a concave reflective surface provided in said body opposite said input interface for receiving said light beam and reflecting said light beam along a near-normal direction;

d) a convex toroidal reflective surface provided in said body for receiving said light beam reflected by said concave reflective surface and reflecting said light beam along an off-normal direction; and

e) an output surface for out-coupling said light beam.

26. The apparatus of claim 25, wherein an azimuth angle between said near-normal direction and said off-normal direction taken about a rotation axis that connects the point of incidence of said light beam on said concave surface to the point of incidence of said light beam on said convex surface is less than 90 degrees.

27. The apparatus of claim 25, further comprising a folding mirror surface for reflecting said light beam within said body.

28. The apparatus of claim 25, wherein said input interface is a surface located adjacent said convex toroidal reflective surface.

29. The apparatus of claim 25, wherein said concave reflective surface is a concave toroidal reflective surface.

30. The apparatus of claim 25, wherein said body comprises a molding material having a substantially uniform coefficient of thermal expansion.

31. The apparatus of claim 25, wherein said concave reflective surface and said convex toroidal reflective surface are coated by a reflecting material on the surface of said body.

32. The apparatus of claim 25, further comprising a light-conditioning element in said body for conditioning said light beam.

33. The apparatus of claim 25, further comprising a light-conditioning element on a surface of said body for conditioning said light beam.

34. The apparatus of claim 25, wherein said input interface is a surface of said body.

35. A monolithic array comprised of a number of apparatus of claim 25.

36. A free space communication system comprising the apparatus of claim 25.

37. A telescopy system comprising the apparatus of claim 25.

38. A method for receiving and guiding a light beam, said method comprising:

a) providing an optical fiber terminator having a body exhibiting a substantially uniform refractive index n_b;

b) admitting said light beam into said body via an input interface;

c) providing a concave reflective surface in said body opposite said input interface for receiving and reflecting said light beam along a near-normal direction;

d) providing a convex toroidal reflective surface in said body for receiving said light beam reflected by said concave reflective surface and reflecting said light beam along an off-normal direction; and

e) out-coupling said light beam via an output surface of said body.